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Measles, the media, and MMR: Impact of the 2014–15 measles outbreak

Jessica R. Cataldi [a,*], Amanda F. Dempsey [b], Sean T. O'Leary [a,b]

[a] Department of Pediatrics, Section of Infectious Diseases, University of Colorado Denver, 13123 East 16th Avenue, Aurora, CO 80045, USA
[b] Adult and Child Consortium for Outcomes Research and Delivery Science (ACCORDS), University of Colorado Denver, 13199 East Montview Blvd, Aurora, CO 80045, USA

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ABSTRACT

Objective: In late 2014, a measles outbreak beginning in California received significant media attention. To better understand the impact of this outbreak, we conducted a survey to assess and compare among vaccine hesitant and non-hesitant new mothers how this outbreak affected vaccine knowledge, attitudes, vaccination plans, and media use.
Methods: A cross-sectional email survey of English-speaking women with a child ⩽1 year old using a convenience sample of women from nine obstetrics and gynecology (OB/GYN) practices in Colorado assessed vaccine hesitancy, knowledge and attitudes about MMR vaccines and the outbreak, MMR vaccination plans before and after the outbreak, and use of and trust for media sources related to the outbreak.
Results: The response rate was 50% (351/701). Knowledge about the outbreak was high and vaccination attitudes were mostly favorable. Forty-eight percent of respondents thought MMR vaccine was more important after the outbreak. Online news (76%), television news (75%), and social media (68%) were the most frequently used media sources, yet were highly trusted by only 18%, 22%, and 1% of respondents respectively. Government websites (34%) and information from a doctor's office (34%) were infrequently used, but were highly trusted by 62% and 60% of respondents. Knowledge of the outbreak was lower among vaccine-hesitant respondents. Few mothers changed MMR vaccination plans after the outbreak.
Conclusions: New mothers had high levels of knowledge and favorable attitudes about vaccination after the 2014–15 measles outbreak. Media sources used the most are not the most trusted. Communication about outbreaks of vaccine-preventable diseases should include spread of accurate information to new media sources and strengthening of existing trust in traditional media.

1. Introduction

In December 2014, several cases of measles occurred among recent visitors of Disney theme parks in California. As more cases were reported to the California Department of Public Health, the Centers for Disease Control and Prevention (CDC) issued a press release and notifications to other state public health departments. By April 2015, 111 cases linked to this outbreak were identified in seven US states, Mexico, and Canada. Almost half of cases were unvaccinated individuals and many others had unknown vaccination status [1,2]. The outbreak generated significant media attention and public dialogue about the risks of not vaccinating and helped to fuel controversial California legislation eliminating personal belief exemptions for school-mandated vaccines [3,4].

In the US, several studies have demonstrated that most parents trust their child's doctor as an important source for information about vaccination [5–7]. However, they also place varying amounts of trust in media sources such as websites, television, and news articles [5]. UK studies demonstrate that as measles outbreaks occurred in the early 2000s, newspaper articles continued to focus reporting on the MMR vaccine controversy (related to the now-refuted vaccine-autism link), rather than the outbreaks [8]. Many believe that continued negative media communication about MMR vaccine triggered sustained declines in MMR vaccination rates [9]. Falling vaccination rates have had consequences. In 2008, England and Wales had 1348 confirmed measles cases and measles was declared endemic in the United Kingdom again after having been eliminated [10,11]. From 2009 to 2014, the United States had a median of 10 measles outbreaks per year compared to 4 outbreaks per year from 2001 to 2008 [12]. Worldwide there were 267,482 measles cases in 2014 and an estimated 114,900 deaths [13].

Abbreviations: VPD, vaccine-preventable disease.

* Corresponding author.
E-mail addresses: Jessica.Cataldi@childrenscolorado.org (J.R. Cataldi), Amanda.Dempsey@ucdenver.edu (A.F. Dempsey), Sean.O'Leary@childrenscolorado.org (S.T. O'Leary).

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In contrast to the UK experience, communication around the 2014–15 US measles outbreak featured pro-vaccine messages highlighting the importance of timely vaccination. These events provide a unique opportunity to understand how positive media attention may have influenced vaccination attitudes and behaviors of new mothers. The objectives of this study were to assess among new mothers: (1) knowledge of this measles outbreak, and reported interest in and importance of MMR vaccine before versus after the outbreak; (2) any change in MMR vaccination plans as a result of the outbreak; (3) attitudes about the outbreak and vaccine hesitancy; and (4) use of and trust in different media sources for information about vaccines. We hypothesized that after the outbreak, mothers would consider timely MMR vaccination more important, and that some mothers who had originally planned to follow a non-recommended MMR vaccination schedule changed to the recommended schedule because of the outbreak. Secondary objectives were to compare knowledge and attitudes about the outbreak between vaccine hesitant and non-hesitant mothers as well as between mothers following recommended and non-recommended vaccination plans.

2. Methods

A cross-sectional e-mail survey was administered from April-June 2015 to patients at nine obstetrics and gynecology (OB/GYN) practices in Colorado who had previously completed a paper survey June-August 2014 about personal vaccination status and agreed to be contacted for future surveys [14,15]. Eligible women were those who provided a working e-mail address, could answer the survey in English, and had an estimated delivery date between June 2014 and May 2015. Women expected to have a child $\leqslant$1 year of age at the time of the survey were targeted, anticipating that they would have been interested in this outbreak and thinking about vaccines, noting that MMR vaccination is recommended between 12 and 15 months of age in the US [16]. This study was approved by the Colorado Multi-Institutional Review Board.

2.1. Survey design

Outcomes assessed in this study were knowledge of the outbreak, interest in MMR vaccine, importance of MMR vaccine, and change in MMR vaccination plans after the outbreak. Knowledge was measured using a series of 16 true/false statements about the outbreak developed using information available from CDC, [2] and piloted among new mothers to assess for clarity. Interest in and importance of MMR vaccine were assessed by asking mothers if, after the outbreak, their interest in their child receiving MMR vaccine or perceived importance of MMR vaccine had increased, decreased, or was unchanged. Respondents were queried about MMR vaccination plans for their child before and after the outbreak, as well as general vaccination plans. Attitudes about pro- and anti-vaccine messages brought forth in the media during the outbreak were assessed using four-point Likert scales of agreement. Vaccine hesitancy was measured using a validated, five-item, short-form of the Parental Attitudes about Childhood Vaccination (PACV) survey [17,18] that identifies vaccine-hesitant parents (personal communication, Aug 13, 2014 e-mail from D.J. Opel). Respondents were asked whether they used each of 11 different media sources for information about this measles outbreak and MMR vaccine. Trust of each media source was measured using Likert scale of trust a lot, somewhat, or not at all. Respondents who had never heard of the outbreak completed a truncated survey including vaccination plans, vaccine hesitancy, and demographics. The full survey is available upon request.

Demographic information collected included age in years, child's birth date, education (response choices less than high school, high school, vocational school, college, or advanced degree), household income (response choices less than $50,000, $50,000-$74,999, $75,000-$99,999, $100,000-$149,999, $150,000 or more), insurance type (response choices Medicaid, Child Health Plan plus, private insurance, Colorado Indigent Care Program, or no insurance), household size, number of children, race/ethnicity (response choices White, Black, Asian, American Indian or Alaskan Native, Hispanic or Latino, Native Hawaiian or other Pacific Islander, or other), and primary language (response choices English, Spanish, or other).

2.2. Survey administration

The survey was administered by e-mail and web-based responses recorded using Research Electronic Data Capture (REDCap) [19]. Introductory e-mails advised participants of the survey and included information identifying the OB/GYN practice from which the participant was recruited. E-mails containing the survey link were sent within 7 days and reminders sent once weekly for 3 weeks. Two reminder e-mails were sent close to the end of the study period for participants who had not yet responded. Respondents received a $5 electronic gift card upon completion of the survey.

2.3. Analytic methods

Descriptive statistics were generated for all survey items. Knowledge was measured using percent correct responses. Responses for vaccination plans were categorized as recommended or non-recommended, where non-recommended plans included receiving some but not all recommended vaccines, receiving recommended vaccines on a different schedule, and not receiving any vaccines. Media sources were categorized as new (television talk shows, online news sites, social media, blogs or chatrooms, celebrity opinion) or traditional (brochures from doctor's office, newspapers, television news, radio, government websites). Composite scores were calculated for overall media use and trust by category. Hesitancy was calculated as a sum of Likert responses from the five PACV items, with a score of $\geqslant$3 categorized as hesitant (possible range 1–5). Several demographic measure response categories were combined based on the distribution of the data. Highest level of education was grouped by combining respondents with less than high school education, high school graduates, and vocational school graduates, and combining college graduates and those with advanced degrees. Household income categories were collapsed by combining those making $100,000–149,999 with those making more than $150,000 per year. Insurance types were grouped by combining all categories except private insurance. Number of children was collected as a linear variable and then grouped into one, two, and there or more. Race/ethnicity responses for Native Hawaiian/Pacific Islander, American Indian/Alaska Native, and other were combined due to low numbers. Primary language non-English responses were grouped together due to low numbers.

Proportional responses were compared using χ^2 or Fisher exact tests as appropriate, and means compared using *t*-tests. Analyses were performed in Stata (version 11.2). A p-value of $\leqslant$0.05 was considered significant.

3. Results

3.1. Study population

Response rate was 50% (351 of 701). Eight respondents were excluded because they did not have a child $\leqslant$1 year old. As shown